Illinois Department of Transportation

To:	Anthony J. Quigley	Attn:	John Baczek
From:	Jack A. Elston	By:	Michael Brand MDB
Subject:	Pavement Design Approval		
Date:	February 21, 2019		

Route:	IL 47	Job No.:	C-91-321-15
Section:	(105XB)B-R	Contract No.:	62A80
County:	McHenry	Target Letting:	06CY19
Limits:	at the Kishwaukee River		

We have reviewed the pavement design for the above referenced project which was submitted on December 28, 2018. The scope of the project involves realignment of IL 47 to the east for a new structure over the Kishwaukee River. The realigned pavement will serve as a long term, temporary improvement until the existing structure is replaced with a new southbound structure and the ultimate 4 lane cross section is completed.

The pavement design resulted in two pavement options: 10.25" Full-Depth HMA and 9.25" PCC. The life-cycle cost analysis of those options resulted in the HMA pavement being 17.1% less expensive ($86,595/mile compared to PCC's cost of $101,403/mile). Note, the dollar amounts are revised slightly due to some unit price changes made by the Estimates Unit in Design & Environment.

In summary, the approved pavement design is as follows:

<u>IL 47</u>
10.25" Full-Depth HMA Pavement w/ HMA Shoulders
12" Aggregate Subgrade Improvement

If you have any questions, please contact Mike Brand at (217) 782-7651.

Illinois Department of Transportation

Memorandum

To: Jack Elston — Attn: Michael Brand

From: Jose A. Dominguez — By: Ojas Patel

Subject: Pavement Analysis*

Date: December 28, 2018

*Route: Illinois Route 47
Limits: at Kishwaukee River
Section: (105XB)B-R
Current target: 06CY19

County: McHenry
Contract No.: 62A80
Job No.: C-91-321-15

We have completed the pavement analysis for the above captioned location. Review by the Central Office is required since the total pavement area for reconstruction exceeds 4,750 Square Yards. The following is the scope of the project:

IL 47 realignment to the east to construct a new structure over Kishwaukee River to provide an ultimate improvement of northbound lanes via two separate structures. This realignment will act as a long term improvement until the southbound structure is built. The ultimate improvement cross section will provide 4 lanes for IL 47.

A 20-year pavement analysis was performed on the above segments. We recommend a mechanistic flexible pavement design based on the life cycle cost analysis which favors HMA pavement by 17%.

<u>IL 47</u>
Reconstruction
HMA Shoulder
10 ¼" Full Depth HMA[1, 3]
- 2" Polymerized HMA Surface Course, Mix "E", N70
- 2 ¼" Polymerized HMA Binder Course, IL-19.0, N90
- 6" HMA Base Course, IL-19.0, N90

12" Aggregate Subgrade Improvement[2]

[1]Designer Note 1: Use pay item **40701886, HOT-MIX ASPHALT PAVEMENT (FULL-DEPTH), 10 ¼",** paid for in square yards.

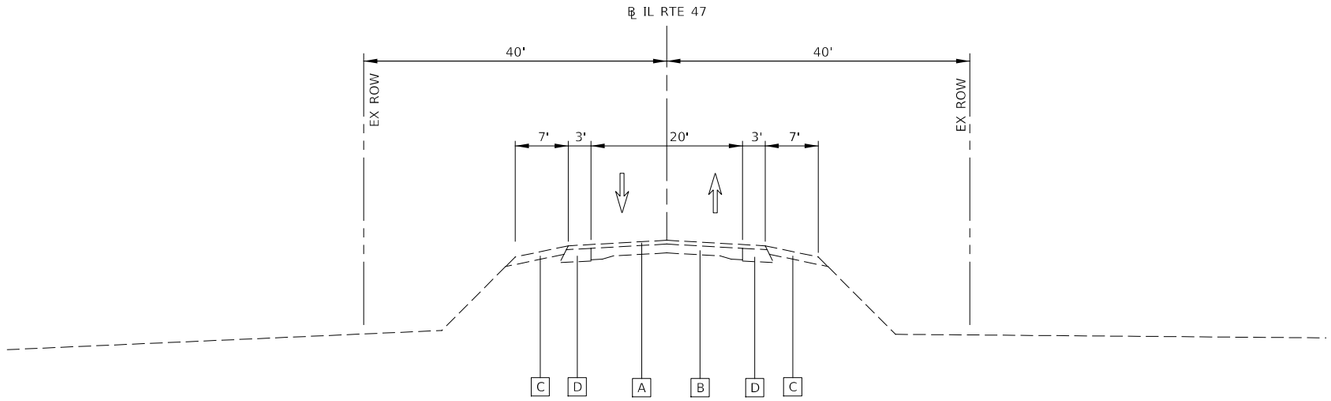
[2]Designer Note 2: Use pay item **30300112, AGGREGATE SUBGRADE IMPROVEMENT, 12",** paid in square yards.

[3]Designer Note 3: Refer to the District One, Bureau of Materials' "Hot-Mix Asphalt – Mix Selection" tables to determine the corresponding HMA mix table requirements for the plans.

If you have any questions or need additional information, please contact Ojas Patel, Pavement Design Engineer, at (847)705-4550.

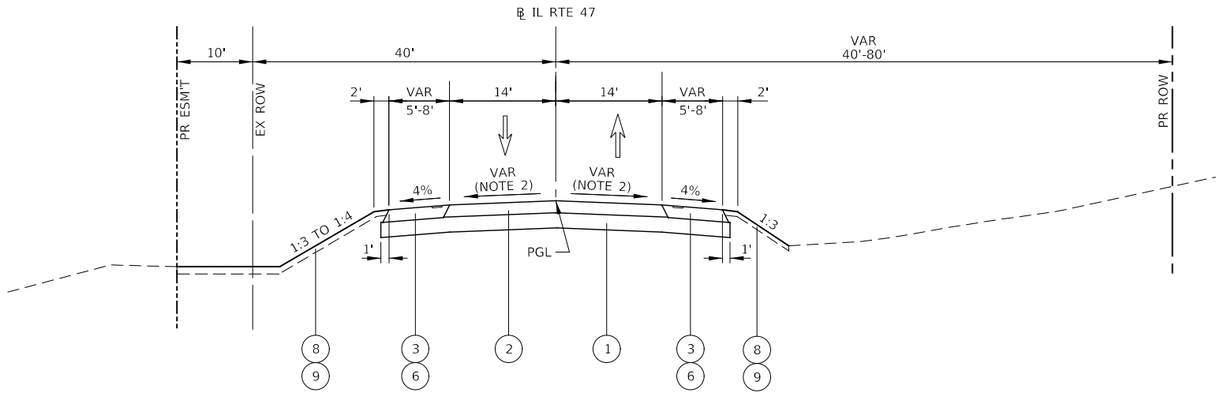
José A. Dominguez

By:
Jose A. Dominguez, P.E.
Project Support Engineer



EXISTING TYPICAL SECTION

ILLINOIS ROUTE 47
STA 19+71 TO STA 43+48



PROPOSED TYPICAL SECTION

ILLINOIS ROUTE 47
STA 19+71 TO STA 22+50

LEGEND

A	EXISTING HMA OVERLAY 3" (SEE NOTE 1)
B	EXISTING CONCRETE PAVEMENT VARIES 7"-9" (SEE NOTE 1)
C	EXISTING AGGREGATE SHOULDER 6" (SEE NOTE 1)
D	EXISTING HMA WIDENING 10" (SEE NOTE 1)
1	AGGREGATE SUBGRADE IMPROVEMENT 12"
2	HOT-MIX ASPHALT PAVEMENT (FULL-DEPTH), 10 ¼"
3	HOT-MIX ASPHALT SHOULDERS, 10 ¼"
4	COMBINATION CONCRETE CURB AND GUTTER, TYPE M-4.24
5	STEEL PLATE BEAM GUARDRAIL, TYPE A, 6 FOOT POSTS
6	SHOULDER RUMBLE STRIPS, 16 INCH (SEE NOTE 3)
7	AGGREGATE SHOULDERS, TYPE B 10"
8	TOPSOIL EXCAVATION AND PLACEMENT (4")
9	SEEDING (SEE NOTE 4)

NOTES

1. EXISTING PAVEMENT THICKNESSES ARE FROM RECORD DRAWINGS.
2. SEE SUPERELEVATION TRANSITION DIAGRAMS FOR PAVEMENT CROSS SLOPES.
3. RUMBLE STRIPS SHALL BE INSTALLED IN ACCORDANCE WITH HIGHWAY STANDARD 642001-02
4. SEE LANDSCAPING PLANS FOR SEEDING INFORMATION.

FILE NAME = D162A80-sht-typical-01.dgn

KNIGHT
Engineers & Architects

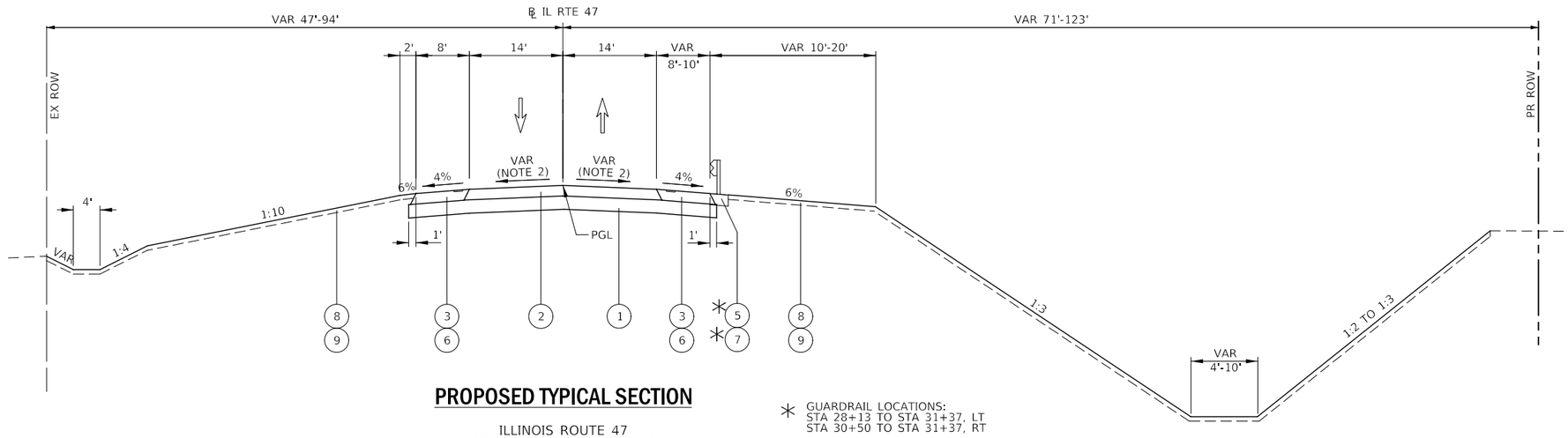
USER NAME = cliss	DESIGNED - WEV	REVISED -
	DRAWN - WEV	REVISED -
PLOT SCALE = 1:20	CHECKED - JCM	REVISED -
PLOT DATE = 1/11/2019	DATE - JANUARY 11, 2019	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

TYPICAL SECTIONS
ILLINOIS ROUTE 47

SCALE: NONE | SHEET 1 OF 5 SHEETS | STA. | TO STA.

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	(105XB)B-R	MCHENRY	165	14
		CONTRACT NO. 62A80		
FED. ROAD DIST. NO. 1	ILLINOIS	FED. AID PROJECT		



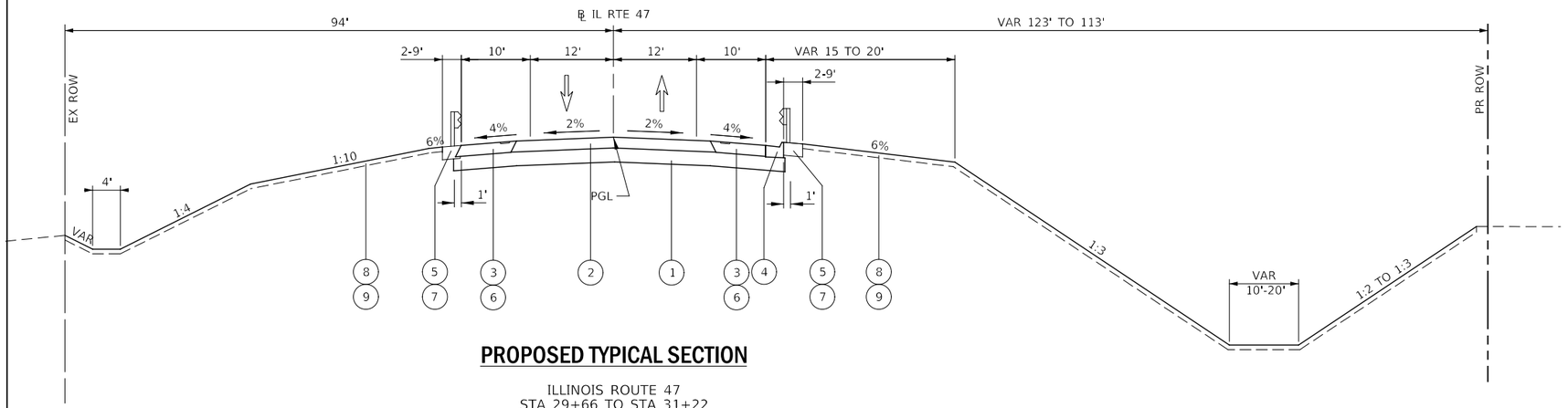
PROPOSED TYPICAL SECTION

ILLINOIS ROUTE 47
STA 22+50 TO STA 29+66

✳ GUARDRAIL LOCATIONS:
STA 28+13 TO STA 31+37, LT
STA 30+50 TO STA 31+37, RT

LEGEND

- A — EXISTING HMA OVERLAY 3" (SEE NOTE 1)
- B — EXISTING CONCRETE PAVEMENT VARIES 7"-9" (SEE NOTE 1)
- C — EXISTING AGGREGATE SHOULDER 6" (SEE NOTE 1)
- D — EXISTING HMA WIDENING 10" (SEE NOTE 1)
- 1 — AGGREGATE SUBGRADE IMPROVEMENT 12"
- 2 — HOT-MIX ASPHALT PAVEMENT (FULL-DEPTH), 10 ¼"
- 3 — HOT-MIX ASPHALT SHOULDERS, 10 ¼"
- 4 — COMBINATION CONCRETE CURB AND GUTTER, TYPE M-4.24
- 5 — STEEL PLATE BEAM GUARDRAIL, TYPE A, 6 FOOT POSTS
- 6 — SHOULDER RUMBLE STRIPS, 16 INCH (SEE NOTE 3)
- 7 — AGGREGATE SHOULDERS, TYPE B 10"
- 8 — TOPSOIL EXCAVATION AND PLACEMENT (4")
- 9 — SEEDING (SEE NOTE 4)



PROPOSED TYPICAL SECTION

ILLINOIS ROUTE 47
STA 29+66 TO STA 31+22
STA 32+98 TO STA 34+50

NOTES

1. EXISTING PAVEMENT THICKNESSES ARE FROM RECORD DRAWINGS.
2. SEE SUPERELEVATION TRANSITION DIAGRAMS FOR PAVEMENT CROSS SLOPES.
3. RUMBLE STRIPS SHALL BE INSTALLED IN ACCORDANCE WITH HIGHWAY STANDARD 642001-02
4. SEE LANDSCAPING PLANS FOR SEEDING INFORMATION.

FILE NAME = D162A80-sht-typical-02.dgn

KNIGHT
Engineers & Architects

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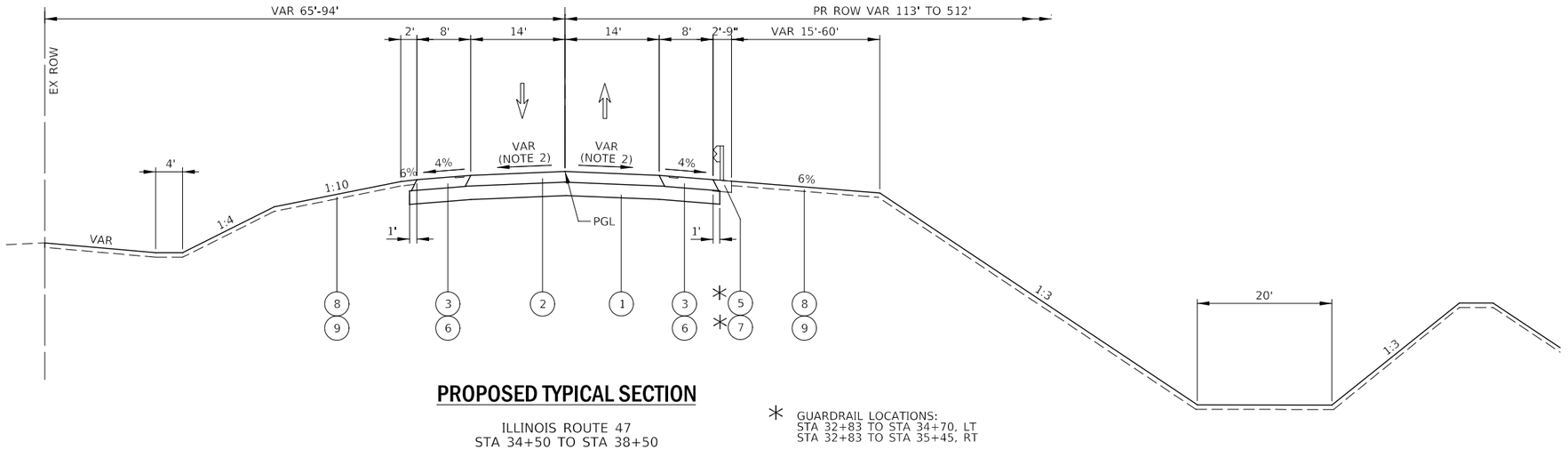
	DRAWN - WEV	REVISED -
PLOT SCALE = 1:20	CHECKED - JCM	REVISED -
PLOT DATE = 1/11/2019	DATE - JANUARY 11, 2019	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

TYPICAL SECTIONS
ILLINOIS ROUTE 47

SCALE: NONE | SHEET 2 OF 5 SHEETS | STA. | TO STA.

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	(105XB)B-R	MCHENRY	165	15
		CONTRACT NO. 62A80		
FED. ROAD DIST. NO. 1	ILLINOIS	FED. AID PROJECT		



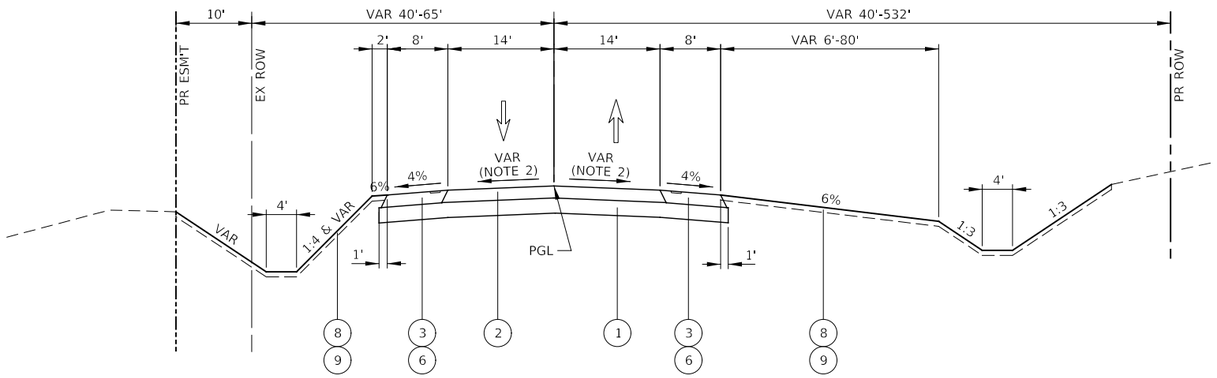
PROPOSED TYPICAL SECTION

ILLINOIS ROUTE 47
STA 34+50 TO STA 38+50

* GUARDRAIL LOCATIONS:
STA 32+83 TO STA 34+70, LT
STA 32+83 TO STA 35+45, RT

LEGEND

- A — EXISTING HMA OVERLAY 3" (SEE NOTE 1)
- B — EXISTING CONCRETE PAVEMENT VARIES 7"-9" (SEE NOTE 1)
- C — EXISTING AGGREGATE SHOULDER 6" (SEE NOTE 1)
- D — EXISTING HMA WIDENING 10" (SEE NOTE 1)
- 1 — AGGREGATE SUBGRADE IMPROVEMENT 12"
- 2 — HOT-MIX ASPHALT PAVEMENT (FULL-DEPTH), 10 ¼"
- 3 — HOT-MIX ASPHALT SHOULDERS, 10 ¼"
- 4 — COMBINATION CONCRETE CURB AND GUTTER, TYPE M-4.24
- 5 — STEEL PLATE BEAM GUARDRAIL, TYPE A, 6 FOOT POSTS
- 6 — SHOULDER RUMBLE STRIPS, 16 INCH (SEE NOTE 3)
- 7 — AGGREGATE SHOULDERS, TYPE B 10"
- 8 — TOPSOIL EXCAVATION AND PLACEMENT (4")
- 9 — SEEDING (SEE NOTE 4)



PROPOSED TYPICAL SECTION

ILLINOIS ROUTE 47
STA 38+50 TO STA 43+48

NOTES

1. EXISTING PAVEMENT THICKNESSES ARE FROM RECORD DRAWINGS.
2. SEE SUPERELEVATION TRANSITION DIAGRAMS FOR PAVEMENT CROSS SLOPES.
3. RUMBLE STRIPS SHALL BE INSTALLED IN ACCORDANCE WITH HIGHWAY STANDARD 642001-02
4. SEE LANDSCAPING PLANS FOR SEEDING INFORMATION.

FILE NAME = D162A80-sht-typical-02.dgn

KNIGHT
Engineers & Architects

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	DRAWN - WEV	REVISED -
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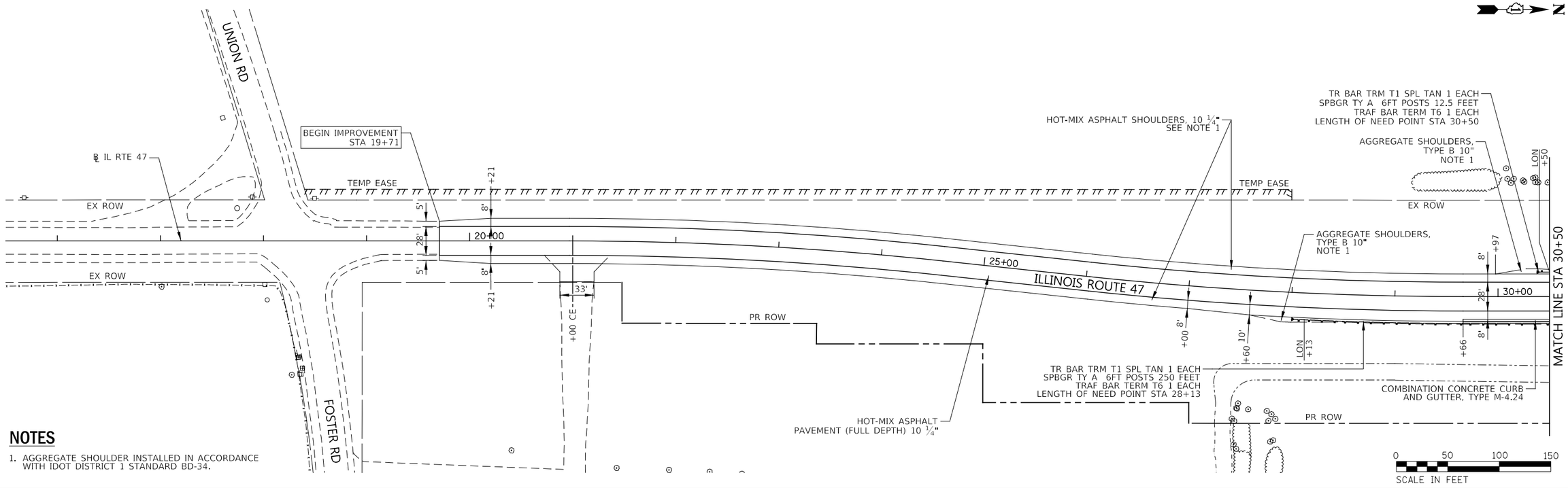
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

TYPICAL SECTIONS
ILLINOIS ROUTE 47

SCALE: NONE | SHEET 3 OF 5 SHEETS | STA. | TO STA.

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	(105XB)B-R	MCHENRY	165	16
		CONTRACT NO. 62A80		
FED. ROAD DIST. NO. 1	ILLINOIS	FED. AID PROJECT		

PLAN
SURVEYED
PLOTTED
ALIGNMENT CHECKED
RT. OF WAY CHECKED
CADD FILE NAME
NOTE BOOK
NO.
BY
DATE



NOTES

1. AGGREGATE SHOULDER INSTALLED IN ACCORDANCE WITH IDOT DISTRICT 1 STANDARD BD-34.

PROFILE
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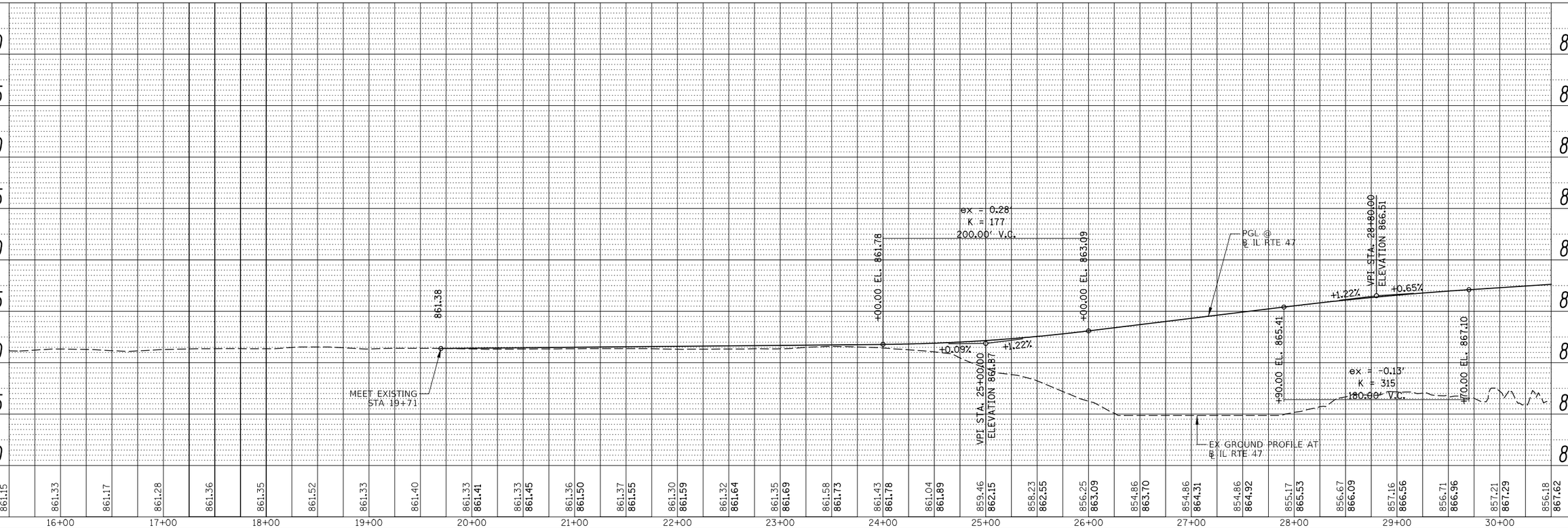
PLOTTED
ALIGNMENT CHECKED
R.O.W. CHECKED
BM. NOTED
STRUCTURE NO'S CHK'D
NOTE BOOK
NO.
BY
DATE



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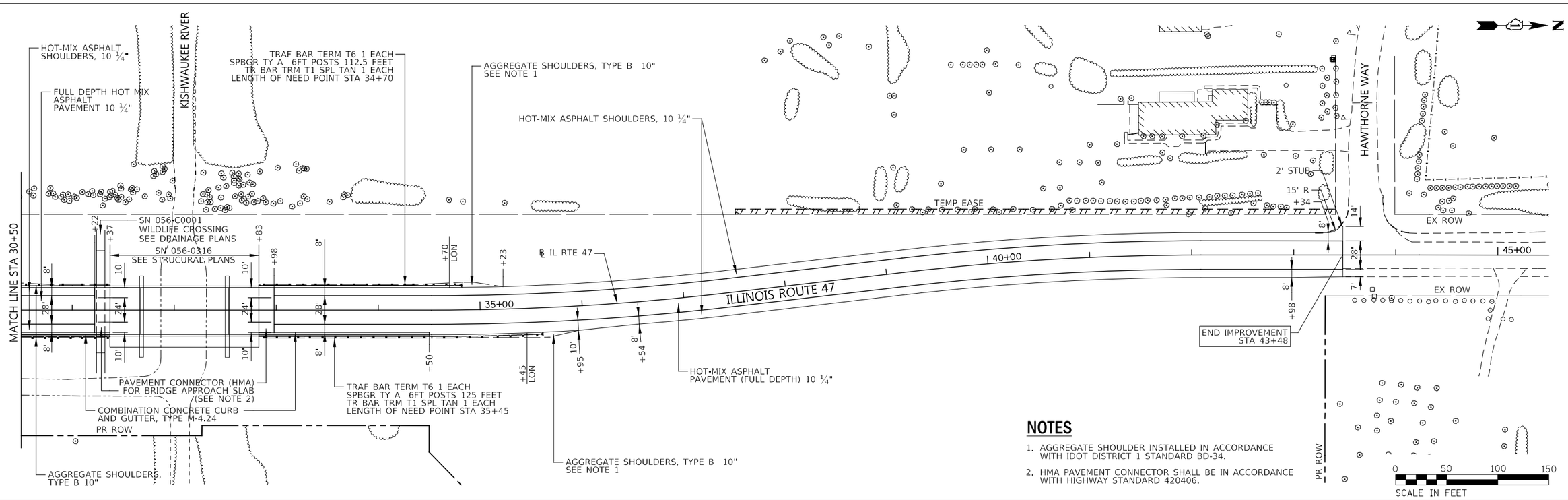
	DRAWN - CEO	REVISED -
PLOT SCALE = 1:100	CHECKED - JCM	REVISED -
PLOT DATE = 1/11/2019	DATE - JANUARY 11, 2019	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

ROADWAY PLAN AND PROFILE SHEETS
ILLINOIS ROUTE 47

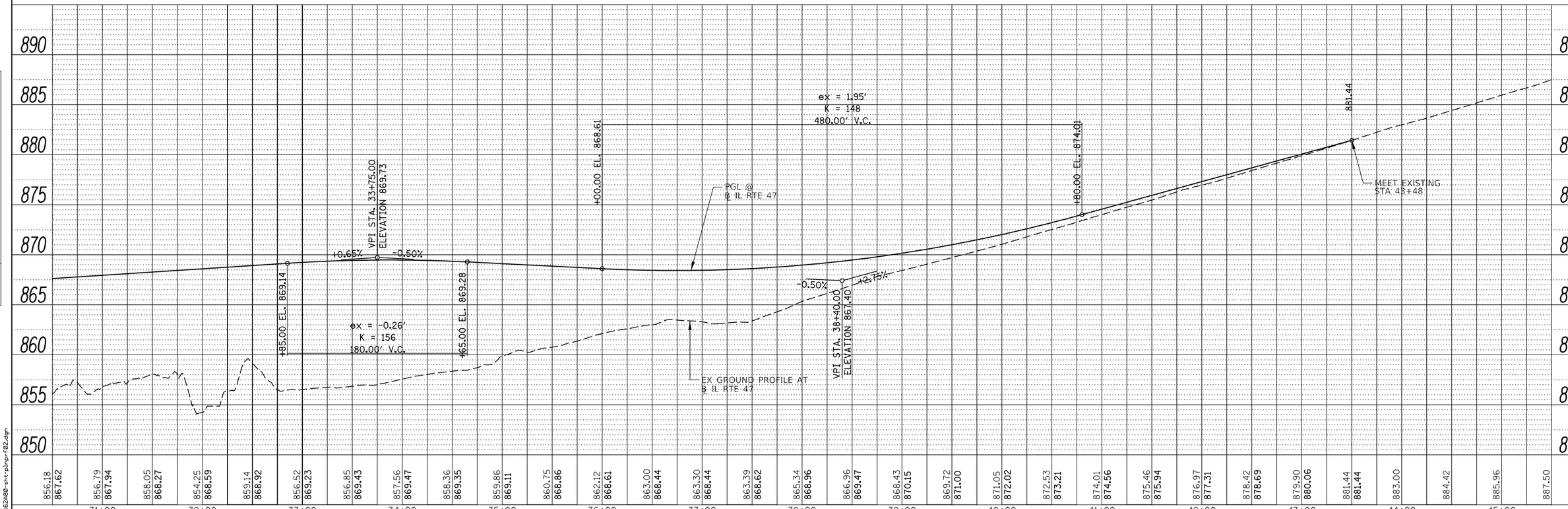
SCALE: 1" = 50' | SHEET 1 OF 2 SHEETS | STA. 15+50 TO STA. 30+50

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	(105XB)B-R	MCHENRY	165	33
		CONTRACT NO. 62A80		
FED. ROAD DIST. NO. 1	ILLINOIS	FED. AID PROJECT		



NOTES

1. AGGREGATE SHOULDER INSTALLED IN ACCORDANCE WITH IDOT DISTRICT 1 STANDARD BD-34.
2. HMA PAVEMENT CONNECTOR SHALL BE IN ACCORDANCE WITH HIGHWAY STANDARD 420406.



PLAN — SURVEYED; PLOTTED; DRAWN; CHECKED; ALIGNMENT CHECKED; RT. OF WAY CHECKED; CADD FILE NAME; NOTE BOOK; NO.; BY; DATE

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Engineers & Architects

USER NAME = cliss	DESIGNED - CEO	REVISED -
	DRAWN - CEO	REVISED -
PLOT SCALE = 1:100	CHECKED - JCM	REVISED -
PLOT DATE = 1/11/2019	DATE - JANUARY 11, 2019	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

ROADWAY PLAN AND PROFILE SHEETS
ILLINOIS ROUTE 47

SCALE: 1" = 50' | SHEET 2 OF 2 SHEETS | STA. 30+50 TO STA. 45+50

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
326	(105XB)B-R	MCHENRY	165	34
		CONTRACT NO. 62A80		
FED. ROAD DIST. NO. 1	ILLINOIS	FED. AID PROJECT		

BDE 5401 Template (Rev. 09/05/2013) **IDOT MECHANISTIC PAVEMENT DESIGN** Printed: 03/05/2019

PROJECT AND TRAFFIC INPUTS (Enter Data in Gray Shaded Cells)

Route:	IL 47	Comments:	IL 47 at Kishwaukee River (part of overall IL 47 corridor)
Section:	(105XB)B-R		BDE corrected the unit prices of pavement removal and shoulder removal in the LCCA.
County:	McHenry	Design Date:	11/09/2018 ONP <-- BY
Location:	south of IL 176	Modify Date:	<-- BY

	ADT	Year
Current:	18,000	2017
Future:	21,000	2040

Facility Type: Other Marked State Route

# of Lanes = 4

Road Class: I

Subgrade Support Rating (SSR): Poor

Construction Year: 2019

Design Period (DP) = 20 years

	Structural Design Traffic			
	Minimum ADT	Actual ADT	Actual %of Total ADT	% of ADT in Design Lane
PV =	0	18,176	92.9%	P = 32%
SU =	250	587	3.0%	S = 45%
MU =	750	802	4.1%	M = 45%
Struct. Design ADT =		19,565	(2029)	

TRAFFIC FACTOR CALCULATION

FLEXIBLE PAVEMENT			RIGID PAVEMENT		
Cpv =	0.15		Cpv =	0.15	
Csu =	132.5		Csu =	143.81	
Cmu =	482.53		Cmu =	696.42	
TF flexible (Actual) =	4.20	(Actual ADT)	TF rigid (Actual) =	5.80	(Actual ADT)
TF flexible (Min) =	3.56	(Min ADT Fig. 54-2.C)	TF rigid (Min) =	5.02	(Min ADT Fig. 54-2.C)

NEW CONSTRUCTION / RECONSTRUCTION PAVEMENT DESIGN CALCULATIONS

Full-Depth HMA Pavement

Use TF flexible = 4.20

PG Grade Lower Binder Lifts = PG 64-22 (Fig. 53-4.R)

Goto Map

HMA Mixture Temp. = 73.5 deg. F (Fig. 54-5.C)

Design HMA Mixture Modulus (E_{HMA}) = 740 ksi (Fig. 54-5.D)

Design HMA Strain (ε_{HMA}) = 80 (Fig. 54-5.E)

Goto Map

Full Depth HMA Design Thickness = 10.25 in. (Fig. 54-5.F)

Limiting Strain Criterion Thickness = 14.25 in. (Fig. 54-5.I)

Use Full-Depth HMA Thickness = 10.25 inches

JPC Pavement

Use TF rigid = 5.80

Edge Support = Tied Shoulder or C.&G.

Rigid Pavt Thick. = 9.25 in. (Fig. 54-4.E)

CRC Pavement

Use TF rigid = 5.80

IBR value = 3

CRCP Thickness = 8.25 in. (Fig. 54-4.M)

TF MUST BE > 60 FOR CRCP

RECONSTRUCTION ONLY (SUPPLEMENTAL) PAVEMENT DESIGN CALCULATIONS

HMA Overlay of Rubblized PCC

Use TF flexible = 4.20

HMA Overlay Design Thickness = 7.75 in. (Fig. 54-5.U)

Goto Map

Limiting Strain Criterion Thickness = in. (Fig. 54-5.V)

Use HMA Overlay Thickness = 999.00 inches

Unbonded Concrete Overlay

Review 54-4.03 for limitations and special considerations.

JPCP Thickness = NA inches

CONTACT BMPR FOR ASSISTANCE

DESIGN TABLES FROM BDE MANUAL CHAPTER 54 - PAVEMENT DESIGN

Class I Roads	Class II Roads	Class III Roads	Class IV Roads
4 lanes or more Part of a future 4 lanes or more One-way Streets with ADT > 3500	2 lanes with ADT > 2000 One way Street with ADT <= 3500	2 Lanes (ADT 750 -2000)	2 Lanes (ADT < 750)

	Min. Str. Design Traffic (Fig 54-2.C)		
Facility Type	PV	SU	MU
Interstate or Freeway	0	500	1500
Other Marked State Route	0	250	750
Unmarked State Route	No Min	No Min	No Min

Class Table for One-Way Streets	
ADT	Class
0 - 3500	II
>3501	I

	Traffic Factor ESAL Coefficients			
	Rigid (Fig. 54-4.C)		Flexible (Fig. 54-5.B)	
Class	Csu	Cmu	Csu	Cmu
I	143.81	696.42	132.50	482.53
II	135.78	567.21	112.06	385.44
III	129.58	562.47	109.14	384.35
IV	129.58	562.47	109.14	384.35

Class Table for 2 or 3 lanes (not future 4 lane & not one-way street)	
ADT	Class
0 - 749	IV
750 - 2000	III
>2000	II

	Design Lane Distribution Factors For Structural Design Traffic (Fig. 54-2.B)					
	Rural			Urban		
Number of Lanes	P	S	M	P	S	M
1 Lane Ramp	100%	100%	100%	100%	100%	100%
2 or 3	50%	50%	50%	50%	50%	50%
4	32%	45%	45%	32%	45%	45%
6 or more	20%	40%	40%	8%	37%	37%

BDE 5401 Template (Rev. 09/05/2013) Printed: 03/05/2019

LIFE-CYCLE COST ANALYSIS: NEW CONSTRUCTION / RECONSTRUCTION

FULL-DEPTH HMA PAVEMENT

Standard Design

ROUTE			IL 47		
SECTION			(105XB)B-R		
COUNTY			McHenry		
LOCATION			south of IL 176		
FACILITY TYPE			NON-INTERSTATE		
PROJECT LENGTH			2200 FT	= = >	0.42 Miles
# OF CENTERLINES			1 CL		
# OF LANES			2 LANES		
# OF EDGES			2 EP		
LANE WIDTH - AVERAGE			14 FT		
SHOULDER WIDTH	HMA	Left	8 FT		
	HMA	Right	8 FT		
	Total Width of Paved Shoulders		16 FT		
PAVEMENT THICKNESS (FLEXIBLE)			10.25 IN		14.25 IN MAX
SHOULDER THICKNESS			8.00 IN		Standard Design
POLICY OVERLAY THICKNESS			2.25 IN		

FLEX PAVEMENT TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
	3.56	4.20	4.20

Read Me!

HMA COST PER TON	UNIT PRICE
HMA SURFACE	$90.61 / TON
HMA TOP BINDER	$82.57 / TON
HMA LOWER BINDER	$76.76 / TON
HMA BINDER (LEVELING)	$82.57 / TON
HMA SHOULDER	$72.00 / TON

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT		UNIT PRICE		COST
HMA PAVEMENT (FULL-DEPTH)	(10.25")	6,844	SQ YD	*	$47.98	/ SQ YD	$328,396
HMA SURFACE COURSE	(2.00")	771	TONS		$90.61	/ TON	$0
HMA TOP BINDER COURSE	(2.25")	878	TONS		$82.57	/ TON	$0
HMA LOWER BINDER COURSE	(6.00")	2,399	TONS		$76.76	/ TON	$0
HMA SHOULDER	(8.00")	1,752	TONS		$72.00	/ TON	$126,157
CURB & GUTTER		0	LIN FT		$30.00	/ LIN FT	$0
SUBBASE GRAN MATL TY C (TONS)		162	TONS		$25.00	/ TON	$4,050
IMPROVED SUBGRADE:	Aggregate	11,418	SQ YD		$7.00	/ SQ YD	$79,926
Reserved For User Supplied Item		0	UNITS		$0.00	/ UNITS	$0
Reserved For User Supplied Item		0	UNITS		$0.00	/ UNITS	$0
PAVEMENT REMOVAL		6,844	SQ YD		$10.00	/ SQ YD	$68,440
SHOULDER REMOVAL		3,911	SQ YD		$15.00	/ SQ YD	$58,665

Note: * Denotes User Supplied Quantity

FLEXIBLE CONSTRUCTION INITIAL COST	$665,634
FLEXIBLE CONSTRUCTION ANNUAL COST PER MILE	$65,155

MAINTENANCE COSTS:

ITEM		THICKNESS	MATERIAL	UNIT COST	
ROUTINE MAINTENANCE ACTIVITY				$0.00	LANE-MILE / YEAR
HMA OVERLAY PVMT SURF		(2.00")	Surface Mix	$10.21	/ SQ YD
HMA OVERLAY PVMT		(2.25")		$11.15	/ SQ YD
HMA SURFACE MIX		(1.50")	Surface Mix	$7.65	/ SQ YD
HMA BINDER MIX		(0.75")	Leveling Binder Mix	$3.51	/ SQ YD
HMA OVERLAY SHLD	(Year 30)	(2.25")	Shoulder Mix	$9.07	/ SQ YD
HMA OVERLAY SHLD		(2.00")	Shoulder Mix	$8.06	/ SQ YD
MILLING (2.00 IN)				$3.00	/ SQ YD
PARTIAL DEPTH PVMT PATCH		(Mill & Fill Surf)	Surface Mix	$80.15	/ SQ YD
PARTIAL DEPTH SHLD PATCH		(Mill & Fill Surf)	Shoulder Mix	$78.06	/ SQ YD
PARTIAL DEPTH PVMT PATCH		(Mill & Fill +2.00")	Leveling Binder Mix	$79.25	/ SQ YD
PARTIAL DEPTH SHLD PATCH		(Mill & Fill +2.00")	Shoulder Mix	$78.06	/ SQ YD
LONGITUDINAL SHOULDER JOINT ROUT & SEAL				$2.00	/ LIN FT
CENTERLINE JOINT ROUT & SEAL				$2.00	/ LIN FT
RANDOM / THERMAL CRACK ROUT & SEAL		(100% Rehab = 110.00' / Station / Lane)		$2.00	/ LIN FT

FLEXIBLE TOTAL LIFE-CYCLE COST	$884,670
FLEXIBLE TOTAL ANNUAL COST PER MILE	$86,595

MAINTENANCE AND REHABILITATION ACTIVITY SCHEDULE 03/05/19

FULL-DEPTH HMA PAVEMENT
HMA OVERLAY OF RUBBLIZED PCC PAVEMENT
Figure 54-7.C
STANDARD DESIGN

MAINTENANCE COSTS:	ITEM	%	QUANTITY	UNIT	UNIT COST		COST	PRESENT WORTH
YEAR 5								
	LONG SHLD JT R&S	100.00%	4,400	LIN FT	$2.00		$8,800	
	CNTR LINE JOINT R&S	100.00%	2,200	LIN FT	$2.00		$4,400	
	RNDM / THRM CRACK R&S	50.00%	2,420	LIN FT	$2.00		$4,840	
	PD PVMT PATCH M&F SURF	0.10%	7	SQ YD	$80.15		$561	
	PWFn =	0.8626		PW =	0.8626	X	$18,601	$16,045
YEAR 10								
	LONG SHLD JT R&S	100.00%	4,400	LIN FT	$2.00		$8,800	
	CNTR LINE JOINT R&S	100.00%	2,200	LIN FT	$2.00		$4,400	
	RNDM / THRM CRACK R&S	50.00%	2,420	LIN FT	$2.00		$4,840	
	PD PVMT PATCH M&F SURF	0.50%	34	SQ YD	$80.15		$2,725	
	PWFn =	0.7441		PW =	0.7441	X	$20,765	$15,451
YEAR 15								
	MILL PVMT & SHLD 2.00"	100.00%	10,756	SQ YD	$3.00		$32,268	
	PD PVMT PATCH M&F ADD'L 2.00"	1.00%	68	SQ YD	$79.25		$5,389	
	HMA OVERLAY PVMT 2.00"	100.00%	6,844	SQ YD	$10.21		$69,873	
	HMA OVERLAY SHLD 2.00 "	100.00%	3,911	SQ YD	$8.06		$31,539	
	PWFn =	0.6419		PW =	0.6419	X	$139,069	$89,263
YEAR 20								
	LONG SHLD JT R&S	100.00%	4,400	LIN FT	$2.00		$8,800	
	CNTR LINE JOINT R&S	100.00%	2,200	LIN FT	$2.00		$4,400	
	RNDM / THRM CRACK R&S	50.00%	2,420	LIN FT	$2.00		$4,840	
	PD PVMT PATCH M&F SURF	0.10%	7	SQ YD	$80.15		$561	
	PWFn =	0.5537		PW =	0.5537	X	$18,601	$10,299
YEAR 25								
	LONG SHLD JT R&S	100.00%	4,400	LIN FT	$2.00		$8,800	
	CNTR LINE JOINT R&S	100.00%	2,200	LIN FT	$2.00		$4,400	
	RNDM / THRM CRACK R&S	50.00%	2,420	LIN FT	$2.00		$4,840	
	PD PVMT PATCH M&F SURF	0.50%	34	SQ YD	$80.15		$2,725	
	PWFn =	0.4776		PW =	0.4776	X	$20,765	$9,917
	HMA_SD							
YEAR 30	NON-INTERSTATE							
	MILL PVMT & SHLD 2.00"	100.00%	10,756	SQ YD	$3.00		$32,268	
	PD PVMT PATCH M&F ADD'L 2.00"	2.00%	137	SQ YD	$79.25		$10,857	
	PD SHLD PATCH M&F ADD'L 2.00"	1.00%	39	SQ YD	$78.06		$3,044	
	HMA OVERLAY PVMT 2.25 "	100.00%	6,844	SQ YD	$11.15		$76,328	
	HMA OVERLAY SHLD 2.25 "	100.00%	3,911	SQ YD	$9.07		$35,482	
	PWFn =	0.4120		PW =	0.4120	X	$157,979	$65,085
YEAR 35								
	LONG SHLD JT R&S	100.00%	4,400	LIN FT	$2.00		$8,800	
	CNTR LINE JOINT R&S	100.00%	2,200	LIN FT	$2.00		$4,400	
	RNDM / THRM CRACK R&S	50.00%	2,420	LIN FT	$2.00		$4,840	
	PD PVMT PATCH M&F SURF	0.10%	7	SQ YD	$80.15		$561	
	PWFn =	0.3554		PW =	0.3554	X	$18,601	$6,610
YEAR 40								
	LONG SHLD JT R&S	100.00%	4,400	LIN FT	$2.00		$8,800	
	CNTR LINE JOINT R&S	100.00%	2,200	LIN FT	$2.00		$4,400	
	RNDM / THRM CRACK R&S	50.00%	2,420	LIN FT	$2.00		$4,840	
	PD PVMT PATCH M&F SURF	0.50%	34	SQ YD	$80.15		$2,725	
	PWFn =	0.3066		PW =	0.3066	X	$20,765	$6,366
								$219,036
	ROUTINE MAINTENANCE ACTIVITY		0.83	Lane Miles	0.00		$0	$0
					MAINTENANCE LIFE-CYCLE COST			$219,036
45	YEAR LIFE CYCLE	CRFn = 0.0407852			MAINTENANCE ANNUAL COST PER MILE			$21,440

PCC PAVEMENT

JPCP

ROUTE			IL 47		
SECTION			(105XB)B-R		
COUNTY			McHenry		
LOCATION			south of IL 176		
FACILITY TYPE			NON-INTERSTATE		
PROJECT LENGTH			2200 FT	= = >	0.42 Miles
# OF CENTERLINES			1 CL		
# OF LANES			2 LANES		
# OF EDGES			2 EP		
LANE WIDTH - AVERAGE			14 FT		
SHOULDER WIDTH	PCC	Left	8 FT		
	PCC	Right	8 FT		
	Total Width of Paved Shoulders		16 FT		
PAVEMENT THICKNESS (RIGID)		JPCP	9.25 IN		TIED SHLD
SHOULDER THICKNESS			9.25 IN		
POLICY OVERLAY THICKNESS			2.50 IN		

RIGID PAVEMENT TRAFFIC FACTORS		MINIMUM	ACTUAL	USE
		5.02	5.80	5.80
Worksheet Construction Type is	Reconstruction		**The Pavement Type is**	**JPCP**

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT	UNIT PRICE		COST
JPC PAVEMENT	(9.25")	6,844	SQ YD	$57.17	/ SQ YD	$391,271
PAVEMENT REINFORCEMENT		0	SQ YD	$22.00	/ SQ YD	$0
STABILIZED SUBBASE	(4.00")	7,578	SQ YD	$19.00	/ SQ YD	$143,982
PCC SHOULDERS		3,911	SQ YD	$40.00	/ SQ YD	$156,440
CURB & GUTTER		0	LIN FT	$30.00	/ LIN FT	$0
SUBBASE GRAN MATL TY C	(1.50")	477	TONS	$25.00	/ TON	$11,925
IMPROVED SUBGRADE:	Aggregate	11,000	SQ YD	$7.00	/ SQ YD	$77,000
Reserved For User Supplied Item		0	UNITS	$0.00	/ UNITS	$0
Reserved For User Supplied Item		0	UNITS	$0.00	/ UNITS	$0
PAVEMENT REMOVAL		6,844	SQ YD	$10.00	/ SQ YD	$68,440
SHOULDER REMOVAL		3,911	SQ YD	$15.00	/ SQ YD	$58,665

Note: * Denotes User Supplied Quantity

RIGID CONSTRUCTION INITIAL COST	$907,723
RIGID CONSTRUCTION ANNUAL COST PER MILE	$88,852

MAINTENANCE COSTS:

ITEM	THICKNESS	MATERIAL	UNIT COST	
ROUTINE MAINTENANCE ACTIVITY			$0.00	/ LANE-MILE / YEAR
HMA POLICY OVERLAY	(2.50")			
HMA POLICY OVERLAY PVMT	(2.50")		$12.32	/ SQ YD
HMA SURFACE MIX	(1.50")	Surface Mix	$7.65	/ SQ YD
HMA BINDER MIX	(1.00")	Binding Binder Mix	$4.68	/ SQ YD
HMA POLICY OVERLAY SHLD	(2.50")	Shoulder Mix	$10.08	/ SQ YD
CLASS A PAVEMENT PATCHING			$195.00	/ SQ YD
CLASS B PAVEMENT PATCHING			$150.00	/ SQ YD
CLASS C SHOULDER PATCHING			$145.00	/ SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA Surf)		Surface Mix	$77.61	/ SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 2.50")		Surface Mix	$82.69	/ SQ YD
LONGITUDINAL SHOULDER JOINT ROUT & SEAL			$2.00	/ LIN FT
CENTERLINE JOINT ROUT & SEAL			$2.00	/ LIN FT
REFLECTIVE TRANSVERSE CRACK ROUT & SEAL			$2.00	/ LIN FT
RANDOM CRACK ROUT & SEAL	(100% Rehab = 100.00' / Station / Lane)		$2.00	/ LIN FT

RIGID TOTAL LIFE-CYCLE COST	$1,035,947
RIGID TOTAL ANNUAL COST PER MILE	$101,403

JOINTED PLAIN CONCRETE PAVEMENT
UNBONDED JOINTED PLAIN CONCRETE OVERLAY
Figure 54-7.A

MAINTENANCE COSTS:	ITEM	%	QUANTITY	UNIT	UNIT COST		COST	PRESENT WORTH
YEAR 10								
	PAVEMENT PATCH CLASS B	0.10%	7	SQ YD	$150.00		$1,050	
	PWFn =	0.7441		PW =	0.7441	X	$1,050	$781
YEAR 15								
	PAVEMENT PATCH CLASS B	0.20%	14	SQ YD	$150.00		$2,100	
	PWFn =	0.6419		PW =	0.6419	X	$2,100	$1,348
YEAR 20								
	PAVEMENT PATCH CLASS B	2.00%	137	SQ YD	$150.00		$20,550	
	SHOULDER PATCH CLASS C	0.50%	20	SQ YD	$145.00		$2,900	
	LONGITUDINAL SHLD JT R&S	100.00%	4,400	LIN FT	$2.00		$8,800	
	CENTERLINE JT R&S	100.00%	2,200	LIN FT	$2.00		$4,400	
	PWFn =	0.5537		PW =	0.5537	X	$36,650	$20,292
YEAR 25								
	PAVEMENT PATCH CLASS B	3.00%	205	SQ YD	$150.00		$30,750	
	SHOULDER PATCH CLASS C	1.00%	39	SQ YD	$145.00		$5,655	
	PWFn =	0.4776		PW =	0.4776	X	$36,405	$17,387
YEAR 30	NON-INTERSTATE							
	PAVEMENT PATCH CLASS B	4.00%	274	SQ YD	$150.00		$41,100	
	SHOULDER PATCH CLASS C	1.50%	59	SQ YD	$145.00		$8,555	
	HMA POLICY OVERLAY 2.5" (PVMT)	100.00%	6,844	SQ YD	$12.32		$84,352	
	HMA POLICY OVERLAY 2.5" (SHLD)	100.00%	3,911	SQ YD	$10.08		$39,424	
	PWFn =	0.4120		PW =	0.4120	X	$173,431	$71,451
YEAR 35	NON-INTERSTATE							
	LONGITUDINAL SHLD JT R&S	100.00%	4,400	LIN FT	$2.00		$8,800	
	CENTERLINE JT R&S	100.00%	2,200	LIN FT	$2.00		$4,400	
	RANDOM CRACK R&S	50.00%	2,200	LIN FT	$2.00		$4,400	
	REFLECTIVE TRANSVERSE CRACK R&S	40.00%	1,646	LIN FT	$2.00		$3,292	
	PD PVMT PATCH M&F HMA 2.50"	0.10%	7	SQ YD	$82.69		$579	
	PWFn =	0.3554		PW =	0.3554	X	$21,471	$7,630
YEAR 40	NON-INTERSTATE							
	PAVEMENT PATCH CLASS B	0.50%	34	SQ YD	$150.00		$5,100	
	LONGITUDINAL SHLD JT R&S	100.00%	4,400	LIN FT	$2.00		$8,800	
	CENTERLINE JT R&S	100.00%	2,200	LIN FT	$2.00		$4,400	
	REFLECTIVE TRANSVERSE CRACK R&S	60.00%	2,470	LIN FT	$2.00		$4,940	
	RANDOM CRACK R&S	50.00%	2,200	LIN FT	$2.00		$4,400	
	PD PVMT PATCH M&F HMA 2.50"	0.50%	34	SQ YD	$82.69		$2,811	
	PWFn =	0.3066		PW =	0.3066	X	$30,451	$9,335
								$128,224
	ROUTINE MAINTENANCE ACTIVITY		0.83	Lane Miles	$0.00		$0	$0
					MAINTENANCE LIFE-CYCLE COST			$128,224
45	YEAR LIFE CYCLE	CRFn = 0.0407852			MAINTENANCE ANNUAL COST PER MILE			$12,551

LIFE-CYCLE COST ANALYSIS: NEW DESIGN

Calculated / Revised : 12/28/18 9:41 AM

			JPCP	HMA
CONSTRUCTION	INITIAL COST	PRESENT WORTH	$907,723	$665,634
		ANNUAL COST PER MILE	$88,852	$65,155
MAINTENANCE	LIFE-CYCLE COST	PRESENT WORTH	$128,224	$219,036
		ANNUAL COST PER MILE	$12,551	$21,440
TOTAL	LIFE-CYCLE COST	PRESENT WORTH	$1,035,947	$884,670
		ANNUAL COST PER MILE	$101,403	$86,595

LIFE-CYCLE COST ANALYSIS: FINAL SUMMARY

LOWEST COST OPTION	==========>	**HMA**	**$86,595**	
OTHER OPTIONS (LOWEST TO HIGHEST):	TYPE / PERCENTAGE	**JPCP**	$101,403	17.1%

S:\GEN\WPDOCS\Pavement Designs\D-1\IL 47 at the Kishwaukee River - 62A80\[IL 47 - IDOT Mech Pvmt Dgn LCCA - BDE Corrected LCCA.xlsm]LifeCycleCost